

for the construction of tunnels in nests of those species of termites which are constructed of earth or mud apart from the ability to work in the presence of termites and to construct, provision, and seal cells which are resistant to termite attack. As *M. arboreus* at times constructs nests at ground level, it is conceivable that in an earlier evolutionary period during a series of very wet years when the ground was too waterlogged for the construction of nests in the soil the bees started to utilize abandoned termite nests near ground level. From this it would then be a short step to the utilization of occupied nests several feet above the ground, particularly as tunnels are constructed quite rapidly, probably in the space of one day, and in the event of partial blockage by the termites during the night they could very quickly be reopened the following day. Similarly, once a cell has been constructed it is probably provisioned and sealed during the same day.

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Trichoptera of Baja California

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Several collections of Trichoptera from Baja California have recently been made by members of the California Academy of Sciences and the University of California. These collections have largely been responsible for almost doubling the known trichopterous fauna of Baja California. Of particular interest are three new species which are herein described.

To date the majority of Trichoptera from Baja California are also known from the western United States and western Mexico. Future collecting should determine if the new species are endemic species; it is probable that only *Atopsyche hintoni*, n. sp., is confined to the peninsula.

In January 1959, H. B. Leech, California Academy of Sciences, collected one larva and several pupae of a rhyacophilid in a stream near Miraflores, Baja California. The stream is subject to rapid torrents following tropical storms and is considerably scarred. The stream bed contains large boulders and at the time of collecting contained deep pools of water. Mr. Leech states, "I collected chiefly in various shallow pools with sandy shores and bottoms, and in the stream joining them." A mature male was dissected from one pupal case and the new *Atopsyche* described herein is based on that male.

In 1950, H. E. Hinton described the chelate front leg of an undetermined Bolivian *Atopsyche* larva. Of interest to insect morphologists and taxonomists is that, as Hinton discussed, chelate legs are not known from any other trichopteran, nor "in any other endopterygote larvae except in a dytiscid, *Matus bicarinatus* Say. . . ." The significance of Leech's collection is that a definite association of larva, pupa, and adult to a described atopsychid is now possible.

***Atopsyche hintoni* Denning, new species**

(Figs. 1-2)

This is the first *Atopsyche* to be described from Baja California. On the basis of the constricted apical segment of the clasper and the paracercus with two prominent dorsal spines, it is related to *boneti* Ross and King. The paracercus with its distinctive spines and the aedeagus with the ventral lobes will distinguish this species. One mature larva and 4 pupae were collected together. The identity of the larva was established by means of the male metamorphotype.

LARVA.—Length 13 mm, width 1.5 mm. Head fuscus. Frontoclypeus sutures well marked, slightly depressed. Eyes scarcely discernible, antennae atrophied. Four pairs of setae arise from genae, none from frontoclypeus. Two pairs of minute setae arise from labrum near anterior margin. Maxillary palpi with third segment conical and longer than first two; labial palpi single segmented, small (Fig. 2A). Mandible (Fig. 2B) with prominent mesal tooth.

Pronotum yellowish, lateral margins dark, posterior margin black; mesonota and metanota light yellowish color. Legs uniformly yellowish except for the anterior dark stripe of the large coxae. First pair of legs chelate, ventral corner of femur (Fig. 2C), produced into a prominent thumb-like process bearing a rather stout dorsal seta directly mesad; tibia and tarsus greatly reduced, the hinged tibia permitting it and the tarsus to fit closely along edge of the chelated femur (Fig. 2D). Accordingly, a very efficient grasping organ for the predacious larva has been developed in the genus. Anal claspers or hooks (Fig. 2E) short, apically acute, no auxiliary hooks; sclerotized shield present on ninth tergum. External gills absent.

PUPA.—Length 7 mm. Ellipsoid pupae brownish, in appearance very similar to a dipteran puparium. Mandible long, sickle-shaped, mesal margin serrate, apex acute (Fig. 2F). Labrum subtriangular. Mature male removed from pupa and described as a new species.

ADULT.—Sternites 6 and 7 bearing a prominent mesal spine. Genitalia as in Fig. 1. Tenth tergite consists of a large semimembranous lobe directed dorsocaudad, seen from dorsal aspect basal portion flared laterad. Paracercus bearing a strong dorsal spine near apex and a smaller spine near center; apex obtuse, setiferous, bearing an apical dorsad-directed hook. Filicercus filiform, apically clavate, setiferous entire length. Clasper with basal segment practically same width throughout, apical segment slightly constricted, curved ventrad. Aedeagus somewhat slipper-shaped from lateral aspect (Fig. 1), ventral margin produced into a slender, long lobe near base, apical lobe produced caudad and slightly dorsad; seen from ventral aspect only the strong mesal edge discernible, the dorsal portion flared slightly laterad between the paracerci; inner rod plainly visible from ventral or lateral aspect.

Holotype mature male pupa: MIRAFLORES, BAJA CALIFORNIA, 19 January 1959, H. B. Leech. Collected in a stream in ARROYO SAN BERNADINO, about 3 MILES NORTHWEST OF MIRAFLORES, the stream is a tributary to Arroyo San Jose. Paratypes, one mature larva, three immature pupae. Types deposited in California Academy of Sciences, San Francisco, California.

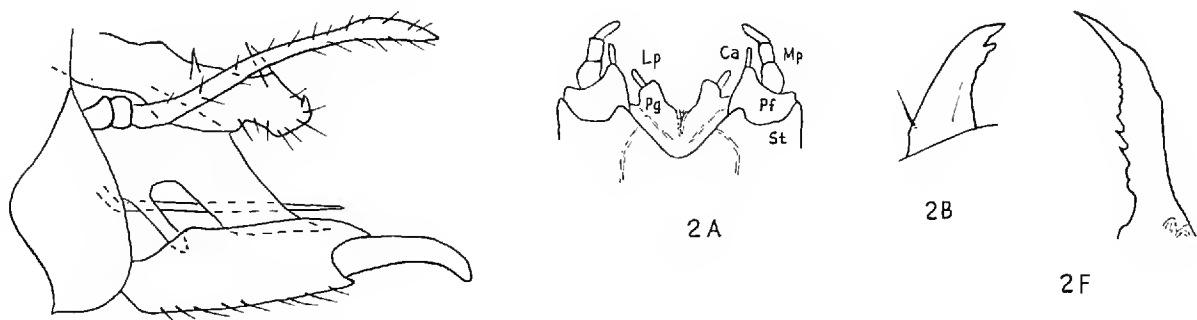
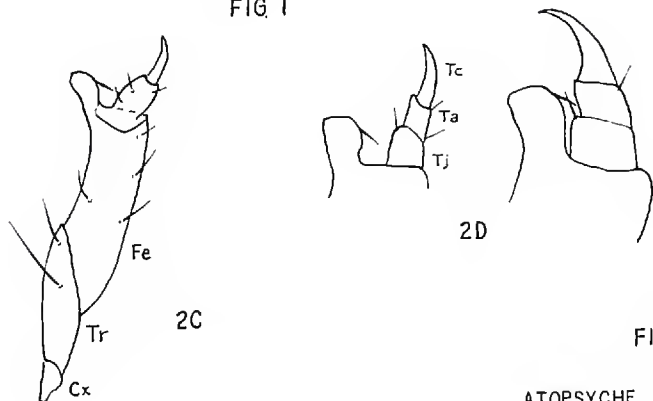


FIG 1

2 A

2 B

2 F



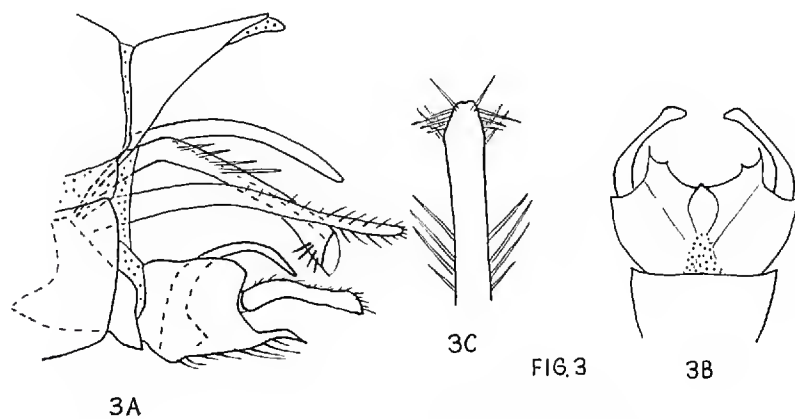
2 C

2 D

2 E

FIG. 2

ATOPSYCHE HINTONI



3 A

3 C

FIG. 3

3 B

TINODES POWELLI

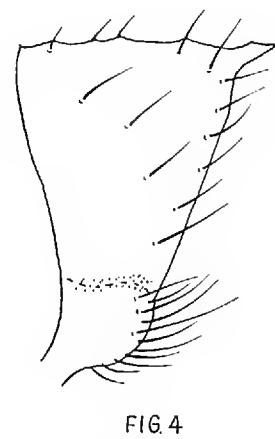
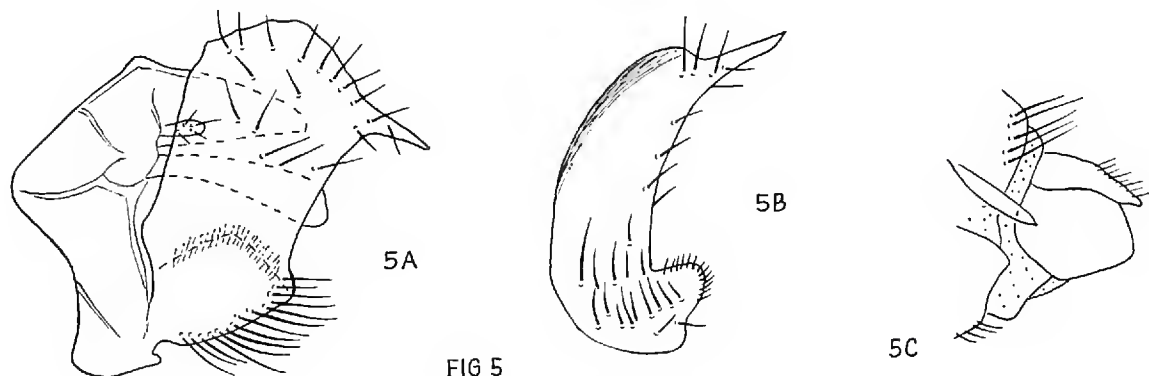


FIG. 4

HELICOPSYCHE MEXICANA



5 A

5 B

5 C

FIG 5

HELICOPSYCHE PIETIA

It is with pleasure that I name this new species in honor of Dr. H. E. Hinton. While at the University of Bristol, Dr. Hinton described the first known chelate front leg of a Trichoptera. Hinton's study of the musculature of the greatly developed femur and trochanter, and the greatly reduced tibia and tarsus revealed very little modification from a nonchelate leg.

Tinodes powelli Denning, new species

(Fig. 3)

This species is related to *consueta* McL. and may be distinguished from it by the long apical segment of the clasper, by the mesal portion of the basal segment of the clasper which is produced into three acute apices rather than two, by the unarmed lobe of the aedeagus, and several other differences.

MALE.—Length 8-9 mm. Wings, body, appendages light brown, palpi similar in color, glabrous. Front tibia with no preapical spur, spurs brownish and glabrous. Genitalia as in Fig. 3. Ninth tergum produced caudodorsad as an elongate triangular lobe, apex fringed with a membranous sheath; ninth sternite largely withdrawn into eighth, only a narrow subtriangular portion exposed. Cerci elongate, fusiform, extending caudad beyond any portion of genitalia, setae minute and sparse. Basal segment of clasper quadrate, ventral corner produced caudad as an acuminate point when viewed laterally (Fig. 3A); from ventral aspect (Fig. 3B), ventral lobe is divided into two acute apices and the mesal lobe into one acute apex; apical segment narrow, somewhat sinuate, apex subacute from lateral aspect. Mesal blade of clasper curved ventrad, acuminate, in about half the males examined a short acute dorsad-curved spine arises from the left basal portion. Aedeagus lobe (the tenth tergite?) single, unarmed; the lobe is normally placed within a dorsal groove of the aedeagus. Aedeagus (Fig. 3C) armed with prominent basal and apical spines.

FEMALE.—Length 10-11 mm. General structure and coloration similar to male except for usual antigenetic differences. Apical segments of abdomen characteristically elongate and conical. Eighth tergite large, occupying a major portion of segment. Tenth tergite consists of a pair of elongate obtuse plates bearing the usual pair of minute setae distally.

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EXPLANATION OF FIGURES

Fig. 1. *Atopsyche hintoni*, male genitalia, lateral aspect. Fig. 2. *Atopsyche hintoni*, larva, pupa; 2A, maxillo-labrium, ventral aspect; st, stipes; pf, palpifer; mp, maxillary palp; ga, galea; pg, palpiger; lp, labial palp; 2B, right, larval mandible; 2C, larval foreleg; cx, coxa; tr, trochanter; fe, femur; ti, tibia; ta, tarsus; tc, tarsal claw; 2D, larval chelate-claws, enlarged; 2E, right, larval anal hook; 2F, right, pupal mandible. Fig. 3. *Tinodes powelli*, male genitalia; 3A, lateral aspect; 3B, claspers, ventral aspect; 3C, aedeagus, dorsal aspect. Fig. 4. *Helicopsyche mexicana* Banks, clasper, lateral aspect. Fig. 5. *Helicopsyche pietia*, 5A, male genitalia, lateral aspect; 5B, clasper, lateral aspect; 5C, female genitalia, lateral aspect.

Holotype male: SIERRA SAN PEDRO MARTIR, 6,500 feet, LA GRULLA, BAJA CALIFORNIA, MEXICO, 28 May 1958, J. A. Powell. Allotype female, same data as for holotype. Paratypes, 5 males, 1 female, same data as for holotype; 2 males, 2 females, Arroyo Santo Domingo, 5.8 miles from Hamilton Ranch, Baja California, Mexico, 22 April 1963, P. H. Arnaud and H. B. Leech. Paratypes deposited in California Academy of Sciences, San Francisco, California. Holotype and allotype are in the author's collection.

I take pleasure in naming this new *Tinodes* in honor of the collector, Dr. J. A. Powell, California Insect Survey, University of California, Berkeley.

***Helicopsyche pietia* Denning, new species**

(Fig. 5)

This species appears to be related to *mexicana* Banks, and may be distinguished from that species by the acute lateral projection arising from the clasper; in *mexicana* the apical corner is produced into a sharp point (Fig. 4).

MALE.—Length 8–9 mm. Head, body, and appendages light tan color, wings uniformly tan. Sixth sternite bearing a yellowish mesal spur, almost as long as sternite, third and fourth sternites reticulated. Genitalia as in Fig. 5. Ninth sternite narrowed to about half the width of the mesal portion; ninth tergite narrowed and merged into the tenth tergite. Cerci narrow, small, and inconspicuous. Tenth tergite long, narrowed distally, a dorsolateral sclerotized ridge extends entire length. Claspers large, dorsal margin broadly arcuate, caudal margin produced ventrocaudad as a prominent attenuated point (Fig. 5A); ventral margin bearing a dense brush of long, yellowish setae; mesal portion at base cushion-like, bearing dense, short, brownish spines best viewed from laterocaudal view (Fig. 5B); seen from ventrocaudal aspect mesal cushion stalked. Aedeagus slightly curved, cylindrical, apex with mesal incision and extending slightly beyond clasper.

FEMALE.—Length 9–10 mm. Similar to male in general appearance but more robust and slightly darker brown. Fifth, sixth, and seventh sternites reticulated. Sixth and seventh sternites bear a dense row of dark yellow setae. Seventh sternite bearing a small, dark yellow mesal spur. Genitalia typical for genus, as in Fig. 5C.

Holotype male: 3 MILES SOUTHWEST OF MISSION SAN JAVIER SOUTHWEST OF LORETO, BAJA CALIFORNIA, MEXICO; 14 December 1958, H. B. Leech. Allotype female, same data as for holotype. Paratypes, 3 males, 9 females, same data as for holotype. All types in California Academy of Sciences except 2 male and 2 female paratypes in the author's collection.

This is the fifth helicopsychid species described from the U. S. and Mexico. All species but *H. limnella* Ross have been recorded from Mexico.

The key to the males of *Helicopsyche* in the Nearctic by Ross (1944) can be revised to accommodate this new species, as follows:

1. Claspers with apical corner or apicocaudal margin produced into an acute, triangular point 2
Claspers with apical corner rounded 4
2. Mesal process at base of claspers cushion-like, sclerotized mesal projection of sixth sternite yellowish and about half the length of the sternite
mexicana Banks
Mesal process at base of clasper stalked, sclerotized mesal projection of sixth sternite yellowish or black 3
3. Mesal process of sixth sternite black, as long or longer than sternite
limnella Ross
Mesal process of sixth sternite yellow, not as long as sixth sternite .. *pietia*, n. sp.
4. Claspers angled and shaped like a boomerang *piroa* Ross
Claspers only slightly curved, broad, and spatulate *borealis* Hagen

In 1951 Ross recorded 14 species of Trichoptera from Baja California. Additional records that are now available and listed herein increase the known species to 26. In addition to the three new species described here, only three species are as yet known only from Baja California: *Chimarra laguna* Ross, *Polycentropus bartolus* Denning, and *Lepidostoma rhino* Ross.

RHYACOPHILIDAE

1. *Rhyacophila rayneri* Ross California and Baja California
2. *Atopsyche hintoni*, n. sp. Baja California

PHILOPOTAMIDAE

3. *Chimarra angustipennis* Banks Southwestern United States, western Mexico, and Baja California
4. *Chimarra barranca* Denning Baja California, western Mexico, and Texas
5. *Chimarra elia* Ross Southwestern United States, Baja California
6. *Chimarra laguna* Ross Baja California
7. *Chimarra utahensis* Ross Western United States and Baja California

PSYCHOMIIDAE

8. *Polycentropus bartolus* Denning Baja California
9. *Tinodes powelli*, n. sp. Baja California

HYDROPSYCHIIDAE

10. *Hydropsyche occidentalis* Banks Western United States and Baja California
11. *Hydropsyche oslari* Banks Western United States and Baja California
12. *Hydropsyche philo* Ross California and Baja California
13. *Cheumatopsyche micleli* Denning ... California, Baja California, and Sonora
14. *Smicridia* sp. Baja California

LIMNEPHILIDAE

15. *Limnephilus frijole* Ross Southwestern United States and Baja California

ODONTOCERIDAE

16. *Marilia flexuosa* Ulmer Texas, Brazil, Arizona, and Baja California
 17. *Marilia nobscia* Milne Texas and Baja California

CALAMOCERATIDAE

18. *Notiomyia sagittosa* Ross Baja California and Sonora

LEPTOCERIDAE

19. *Oecetis disjuncta* (Banks) Western United States and Baja California
 20. *Oecetis inconspicua* (Walker) North America including Baja California
 21. *Leptocella* sp. Baja California
 22. *Mystacides alafimbriata* Griffin Western United States and Baja California

LEPIDOSTOMATIDAE

23. *Lepidostoma rhino* Ross Baja California

SERICOSTOMATIDAE

24. *Sericostoma griseolum* McLachlan California and Baja California

HELICOPSYCHIDAE

25. *Helicopsyche borealis* (Hagen) North America including Baja California
 26. *Helicopsyche pietia*, n. sp. Baja California

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